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(54) Name of the invention: Catalytic Convertor Used for Exhaust Gas Purification

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(54) [Name of the invention]

Catalytic Converter Used for Exhaust Gas Purification

(57) [Summary]

[Topic]

The topic of the present invention is to suggest a catalytic convertor for the purification of exhaust gas, where the change of the shape of the metal shell is eliminated and through the improvement of the durability properties of the inorganic seal material excellent thermal resistance properties and durability properties are obtained.

[Solution Measure]

Catalytic convertor used for the purification of exhaust gas that is the catalytic convertor 1 which has a structure that is formed from the columnar shaped catalyst support body 4, the cylindrically shaped metal shells 21 and 22, that cover the outer side of this catalyst supporting material, and the inorganic seal layer 3, which is enclosed in the space between these; where at the inner circumference surface of the metal shells in the vicinity of both end parts in the axial direction of the above catalytic

convertor, the inorganic heat insulation material 7 is adhered through the net 8, that is manufactured from metal.

[Range of the claims of the invention]

[Claim 1]

Catalytic convertor used for the purification of exhaust gas characterized by the fact that it is a catalytic convertor, which has a structure that is formed from a columnar shaped catalyst support body, a cylindrically shaped metal shells, that cover the outer side of this catalyst supporting material, and an inorganic seal layer, which is enclosed in the space between these; where at the inner circumference surface of the metal shells in the vicinity of both end parts in the axial direction of the above catalytic convertor, an inorganic heat insulation material is adhered through a net, that is manufactured from metal.

[Claim 2]

Catalytic convertor according to the above described Claim 1 of the present invention, characterized by the fact that the attachment of the above described inorganic heat insulation material to the inner circumference surface of the metal shells, is done as the area is made to be the area from both end parts of the catalytic convertor in the axial direction to both ends parts of the seal layer, which is wrapped on the outer circumference surface of the catalyst supporting material.

[Claim 3]

Catalytic convertor according to the above described Claim 1 of the present invention, characterized by the fact that the attachment of the above described inorganic heat insulation material to the inner circumference surface of the metal shells, is done as the area is made to be the area from both end parts of the catalytic convertor in the axial direction to the area that connects the catalyst supporting material and each end part of the seal layer.

[Claim 4]

Catalytic convertor according to the above described Claim 1 of the present invention, characterized by the fact that as the above described inorganic heat insulation material and the inorganic sheet that is used as the seal layer, a material is used made from an inorganic fiber material that is formed from at least one type or two and more types of materials selected from the group of alumina, silica, alumina - silica and glass, where the thickness of that material is in the range of 2 ~ 6 mm, and the filling density is in the range of 0.10 ~ 0.50 g/cm3.

[Claim 5]

Catalytic convertor according to the above described Claim 1 of the present invention, characterized by the fact that the above described metal net is a stainless steel net where the wire diameter is in the range of 50 ~ 300 microns, and the openings are in the range of # 20 ~ 150 mesh, and it is spot welded to the inner circumference surface of the metal shell, and it is a material that supports in place the inorganic heat insulation material.

[Detailed explanation of the invention]

[0001]

[Technological sphere pertinent to the present invention]

The present invention is an invention about a catalytic convertor used for the purification of exhaust gas from automobiles. And especially the present invention is an invention about a catalytic convertor that is characterized by the fact that it has a heat insulation structure that is formed by the simultaneous use of an inorganic heat insulation material and an inorganic sheet material.

[0002]

[Previous technology]

The catalytic convertors used for the purification of exhaust gas and loaded in automobiles can be generally classified into the shown according to Figure 1 clamp shell type and the shown according to Figure 2 pressure inserted type. The first type convertors have a structure that is formed

from a catalyst supporting material (body) 4, and the metal manufactured shells 21 and 22, that are divided into two halves and that cover the outer surface of this catalyst supporting material, and in the space between those an inorganic sheet 3 and a seal layer, that is wrapped along the axial direction of a metal net 5, are inserted. On the other hand, in the latter case, it is a material where on the outer surface of the above described catalyst supporting material 4, a seal layer formed from an inorganic sheet 3 and a metal net 5, is wrapped in advance, and then this is pressure inserted into the shell 23, which has been manufactured from metal.

[0003]

Usually, the above described inorganic sheet 3 s a material that is formed as a mixture of silica, or alumina type ceramic fiber, non-expandable vermiculite, inorganic bonding material and organic elastic material, is shaped into a sheet form, and this is the seal layer that is used in order to eliminate the leakage of the exhaust gas from the space between the above described metal shell 2 and the catalyst supporting material 4.

[0004]

However, in recent years, because of the improved performance of the automobiles and the different types of law regulations, the temperature of the exhaust gas has been significantly increased, and by using the shown according to Figure 1 and Figure 2 catalytic convertors of the previous technology, the thermal resistance properties of the above described inorganic sheet have become insufficient and it has become difficult to guarantee sufficient sealing properties. And because of this reason, due to the heat of the high temperature exhaust gas, the expansion (swelling) properties of the non-expandable vermiculite inside the inorganic sheet are deteriorated, and because of that, it is considered that due to the pressure pulsation of the exhaust gas the inorganic sheet is eroded.

[0005]

As measures in order to solve the above described problems that are inherent to the previous technology, in the case of the clamp shell type catalytic convertor, also the 2 cone type catalytic convertor has been invented with the goal that the durability properties of the seal layer, that

is manufactured from an inorganic sheet, are sustained. In this case, around the catalyst supporting material 4, as it is shown according to the presented in Figure 3, the manufactured from metal press parts 61, 62 (here below, called cones), are placed and together with that these surround the metal shells 21 and 22, and depending on the requirements, in the space between the above metal shells 21 and 22 and the cones 61 and 62, the inorganic heat insulation material 7, is inserted and placed, and by that the exhaust gas heat that is propagated to the metal shells, is insulated, and due to that the thermal deformation of the above described metal shells 21 and 22, is suppressed. Because of such a structure (the two cone type structure), there is no propagation of the exhaust gas heat to the metal shells, and it is possible to expect that even when exhaust gas that has higher temperature than in the past, flows into the catalyst supporting material, the exhaust gas purification capability, after the initial start up of the engine, would be increased.

[0006]

[Problems solved by the present invention]

However, in the case of this 2 cone structure type catalytic convertor, the cones 61 and 62 are pressed parts that are made using stainless steel plate, and because of that as in the case of the metal shell, they thermally expand from the exhaust gas heat, and because of the mutual interference with the catalyst supporting material 4, there is the risk that the catalyst supporting material 4 would be damaged. As a countermeasure in order to eliminate this interference, it has been necessary to maintain a gap between the cones 61 and 62 and the catalyst supporting material.

[0007]

However, if a gap such as the above described is provided, the heat from the exhaust gas attacks the metal shell and the inorganic sheet and because of that a thermal deformation of the metal shell or a thermal deterioration of the inorganic sheet occur, and hence it has been difficult to completely suppress the scattering of the inorganic sheet. Also, in the case when in the space between the cone parts 61 and 62 and the metal shells 21 and 22, an inorganic heat insulation material is inserted, the same way as it has been described here above, an attack of the exhaust gas is received from the

space between the cones 61 and 62 and the catalyst supporting material 4, and because of that there is the problem that it is said that the inorganic heat insulation material can be easily significantly scattered. And as a solution measure in order to resolve such problem point, the structure has been known, where by using a material formed from a stainless steel mesh or a silica fiber etc., crossed material, the space between the cones and the catalyst supporting material is filled, however, in either of these cases, the number of the parts is increased and together with that the cost is also increased.

[0008]

Then, the present invention is an invention where the problems pertaining to the previous technology have been considered and where by suppressing the heat from the exhaust gas that reaches to the metal shells, the deformation of the metal shells is eliminated, and the durability properties of the above described inorganic seal material, are increased. Also, another goal of the present invention is to suggest a catalytic convertor, used for exhaust gas purification that has excellent heat resistance properties and durability properties, at a low cost.

[0009]

[Measures in order to solve the problems]

In order to practically realize the above described goals rigorous experiments have been performed and as a result from that the authors of the present invention have invented a catalytic convertor used for the purification of exhaust gas characterized by the fact that it is a catalytic convertor, which has a structure that is formed from a columnar shaped catalyst support body, a cylindrically shaped or divided into halves metal shells, that cover the outer side of this catalyst supporting material, and an inorganic seal layer, which is enclosed in the space between these; where at the inner circumference surface of the metal shells in the vicinity of both end parts in the axial direction of the above catalytic convertor, an inorganic heat insulation material is adhered through a net, that is manufactured from metal.

[0010]

Regarding the adhesion of the above described inorganic heat insulation material to the inner circumference surface of the metal shell, it is preferred that it is done at the region from both end parts of the catalytic convertor in the axial direction to both end parts of the seal layer that has been wrapped on the outer circumference part of the catalyst supporting material. Also, it is preferred that the attachment of the above described inorganic heat insulation material to the inner circumference surface of the metal shells, is done as the area is made to be the area from both end parts of the catalytic convertor in the axial direction to the area that connects the catalyst supporting material and each end part of the seal layer. Then, it is preferred that as the above described inorganic heat insulation material and the inorganic sheet that is used as the seal layer, a material is used made from an inorganic fiber material that is formed from at least one type or two and more types of materials selected from the group of alumina, silica, alumina - silica and glass, where the thickness of that material is in the range of 2 ~ 6 mm, and the filling density is in the range of 0.10 ~ 0.50 g/cm3. And then also, it is preferred that the above described metal net is a stainless steel net where the wire diameter is in the range of 50 ~ 300 microns, and the openings are in the range of # 20 ~ 150 mesh, and it is spot welded to the inner circumference surface of the metal shell, and it is a material that supports in place the inorganic heat insulation material.

[0011]

[Practical implementation conditions of the present invention]

The essential characteristic of the present invention is the point that on the gas inlet - outlet side corresponding to the metal shell inner circumference surface in the vicinity of both end parts of the convertor in the axial direction, namely, on the region that stretches from both its end parts to both end parts of the catalyst supporting material, an inorganic heat insulation material is adhered through the insertion of stainless steel manufactured net in between them. The primary reason for the adhesion of th inorganic heat insulation material in this region is in order to eliminate the exhaust gas penetration to the seal layer that is formed from the metal shells and the inorganic sheet material, and by that it is possible to significantly increase the durability properties of the above described

metal shells and seal layer. A second reason for that is that because of the fact that the end parts of the heat insulation material and the stainless steel manufactured net, are bonded to each end of the catalyst supporting material, by that there are no "deviations" of the above described catalyst supporting material in the axial direction. And because of that as the seal layer it becomes possible to advantageously use an inorganic sheet with a low filling density (0.10 ~ 0.50), which has not been possible according to the previous technology structure from the point of view of the holding properties capability, and it becomes possible to practically realize a cost reduction.

[0012]

According to the present invention, as the inorganic sheet (material) used as the seal layer and as the inorganic heat insulation material, it is possible to use one type or more types of inorganic fiber materials selected from the group of alumina, silica, alumina - silica, and glass. As the reason for the adherence to these materials, it is the fact that compared to the expandable seal materials that have been used according to the past technology, they do not undergo a deterioration due to the heat from the exhaust gas, and because of that it is possible to significantly increase the critical temperatures for their application and usage.

[0013]

According to the present invention, regarding the reason why the thickness of the seal layer that is formed from an inorganic sheet (material), is limited within the range of 2 ~ 6 mm, it is because of the fact that if this thickness is less than 2 mm, the heat insulation properties are insufficient, and the heat of the exhaust gas is propagated to the metal shells, and due to that there is a thermal deformation of the metal shells. On the other hand, in the case when the thickness exceeds 6 mm, the diameter of the catalyst converter body itself becomes too large, and in practice, it becomes difficult to be loaded into the automobile.

[0014]

Regarding the reason why the filling density of the seal layer that forms the inorganic sheet (material) according to the present invention, is within

the range of 0.10 ~ 0.50 g/cm3, it is because of the following: if the filling density is less than 0.10 g/cm3, the predetermined holding strength is not obtained, and because of the pressure pulsation of the exhaust gas there is the danger of scattering of the sheet material; and on the other hand, in the case when the filling density is larger than 0.50 g/cm3, there is the danger that the inorganic fiber would be fractured and lost. Moreover, it is even more preferable that the filling density of this seal layer is within the range of 0.20 ~ 0.40 g/cm3.

[0015]

Regarding the reason why for the manufactured from stainless steel net, that is used for welding and fixing in order to adhere the inorganic heat insulation material to the inner circumference surface of the metal shell, the diameter of its wire is limited within the range of 50 ~ 300 microns, it is because of the following: if the wire diameter is finer than 50 microns, the durability properties are insufficient, and the net is destroyed and the heat insulation material is scattered, and in the case when the wire diameter exceeds 300 microns, the net body itself becomes a body with high rigidity properties, and the catalyst supporting material is damaged. Also, regarding the reasons why the dimensions of the net openings are within the range of # 20 ~ # 150 mesh, it is because of the fact that if it is less than #20 mesh, the heat insulation material is scattered through the opening parts, and if it is higher than # 150 mesh, the rigidity properties of the net body itself become high, and the catalyst supporting material is damaged.

[0016]

Moreover, regarding the region for the adhesion of the inorganic heat insulation material and the stainless steel manufactured net onto the inner circumference surface of the metal shells, it is done so that they cover the whole region that stretches from both end parts of the catalyst convertor in the axial direction to both end parts of the seal layer that has been wrapped and adhered onto the outer circumference part of the catalyst supporting material. Regarding the reasons why the adhesion is limited to this region, it is because of the following: if the inorganic heat insulation material does not connect to the end parts of the catalyst supporting material, high temperature exhaust gas flows in from the gap, and it transfers its heat to the metal shells, and because of that the above

described metal shells undergo a thermal deformation, and not only that, but also, there is an attack on the seal layer, and it is deteriorated, and this becomes a reason for its scattering.

[0017]

[Practical Examples]

Practical Example 1

By using the diagram shown in Figure 4 an explanation of the practical implementation example will be given, of a catalytic convertor used for exhaust gas purification according to the present invention. Regarding the convertor according to the present invention, as it is shown according to the diagram presented in Figure 4, it is a catalytic convertor that has a structure formed from the columnar shaped catalyst support body 4, the cylindrically shaped metal shells 21 and 22, that cover the outer side of this catalyst supporting material, and the inorganic seal layer 3, which is enclosed in the space between these; where at the inner circumference surface of the metal shells in the vicinity of both end parts in the axial direction of the above catalytic convertor, the inorganic heat insulation material 7 is adhered through the net 8, that is manufactured from metal.

[0018]

Here, the above described seal layer 3 and the inorganic heat insulation material 7 are an alumina fiber mat material, and it has been specified so that its filling density is 0.30 g/cm3. Moreover, regarding the range of the adhesion of the above described inorganic heat insulation material 7 on the inner circumference surface of the metal shells 21 and 22, it is made to be the region that stretches from both end parts of the catalytic convertor 1 in the axial direction to both end parts of the above described seal layer 3.

[0019]

After that, as the manufactured from stainless steel net 8, a stainless steel net is used where the wire diameter is 150 microns and the openings are 50 mesh, and it is placed on the inner circumference surface of the metal shells 21 and 22, and the above described inorganic heat insulation material is

welded onto that net, and by that it is fixed and held in position. Moreover, regarding the region of the adhesion of the above described stainless steel manufactured net onto the inner circumference surface of the metal shells, it is made to be the region that stretches from both end parts of the catalytic convertor in the axial direction and connecting to each of the ends of the above described catalyst supporting material 4 and seal layer 3.

[0020]

Reference Example 1

As a comparative example for the present invention, an exhaust gas purification catalytic convertor will be explained by using the diagram presented in Figure 3. As it is shown according to Figure 3, in the case of the reference example catalytic convertor 1 used for the purification of exhaust gas, it has a structure where the columnar shape catalyst supporting material 4 that has been wrapped by the thermally expandable seal layer 3, is provided, and the cones 61 and 62 are provided that are placed so that there is a gap of approximately at least 0.5 mm or more with the above catalyst supporting material, and together with that this is enclosed within the metal shells 21 and 22, and in the gap between these metal shells 21 and 22 and the cones 61 and 62, a ceramic fiber mat material is inserted.

[0021]

[Results from the present invention]

As it has been explained here above, according to the present invention, it is possible to suggest a catalytic convertor used for the purification of exhaust gas that has high thermal resistance properties and high durability properties.

[Simple explanation of the figures]

[Figure 1]

Figure 1 represents a disassembled three-dimensional view of the clamp

shell type catalytic convertor.

[Figure 2]

Figure 2 represents disassembled three-dimensional view of the pressure inserted type catalytic convertor.

[Figure 3]

Figure 3 represents a disassembled three-dimensional view of the 2 cone type catalytic convertor.

[Figure 4]

Figure 4 represents a disassembled three-dimensional view of the catalytic convertor according to the present invention.

[Explanation of the symbols]

1	catalytic convertor
21, 22	metal shells
3	seal layer
4	catalyst supporting material (body)
7	inorganic heat insulation material
8	stainless manufactured net

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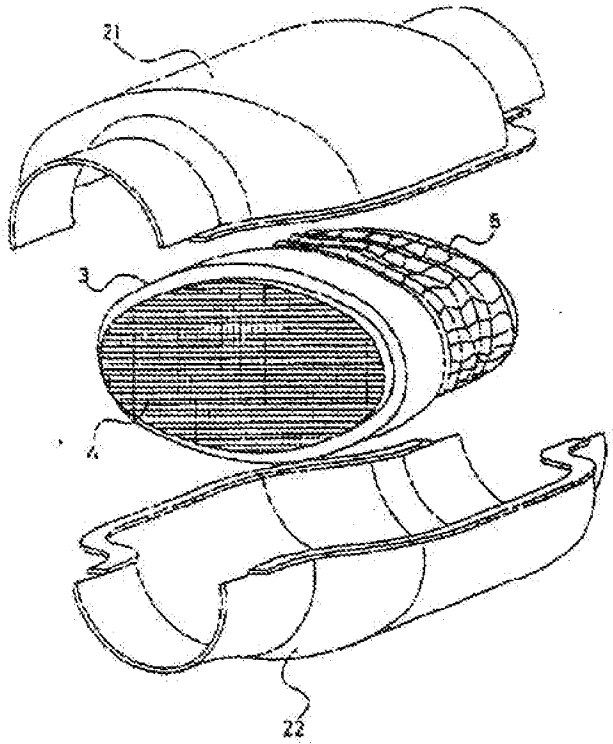
【図1】



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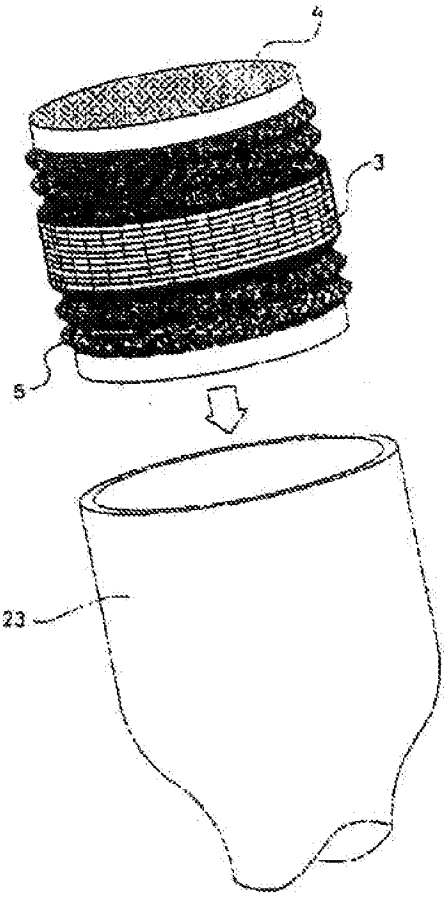

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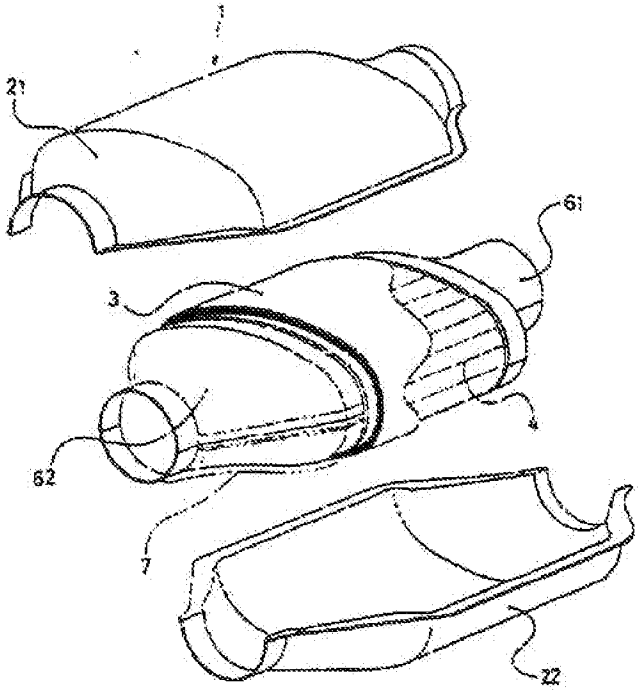
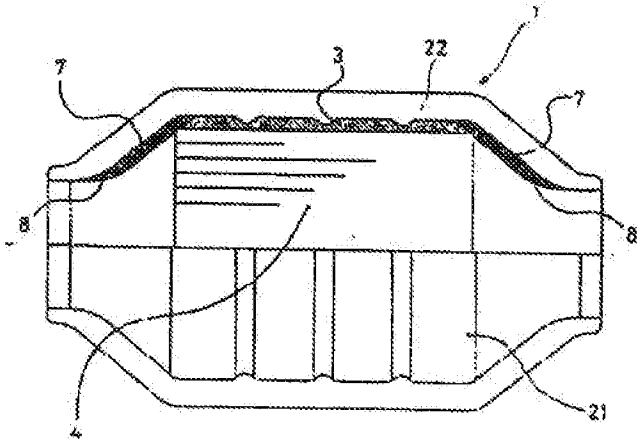


【図４】



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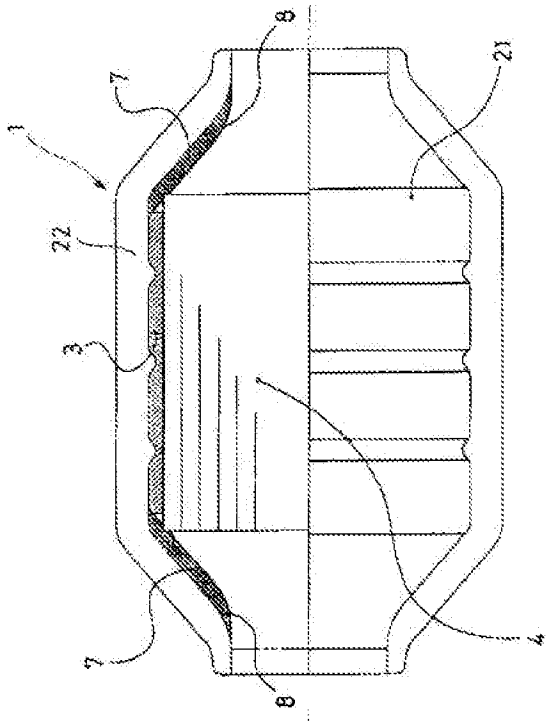
最終頁に続く

(54)【発明の名称】　排気ガス浄化用触媒コンバータ

(57)【要約】

【課題】金属シェルの変形を防止して，無機シール材の耐久性を向上させることにより、耐熱性および耐久性に優れた排ガス浄化用触媒コンバータを提供すること。

【解決手段】柱状の触媒保持体４と、この触媒保持体の外側に被せる円筒状の金属シェル21、22およびこれらの間に介装狭持した無機シート層からなるシール層３によって構成された触媒コンバータ１において，該触媒コンバータの軸方向の両端部近傍の金属シェル内周面に、金属製ネット８を介して無機質断熱材７を取付けた排気ガス浄化用触媒コンバータ。



【特許請求の範囲】

【請求項１】　柱状の触媒保持体と、この触媒保持体の外側に被せる円筒もしくは半割り状の金属シェルおよびこれらの間に介装狭持した無機シートからなるシール層によって構成された触媒コンバータにおいて、該触媒コンバータの軸方向の両端部近傍の金属シェル内周面に、金属製ネットを介して無機質断熱材を取付けたことを特徴とする排気ガス浄化用触媒コンバータ。

【請求項２】　上記無機質断熱材の金属シェル内周面への取付けは、触媒コンバータの軸方向の両端部から触媒保持体の外周部に巻き付けられたシール層の両端部にかけての領域とすることを特徴とする請求項１に記載の触媒コンバータ。

【請求項３】　上記無機質断熱材の金属シェル内周面への取付けは、触媒コンバータの軸方向の両端部から触媒保持体およびシール層の各端部に接する領域とすることを特徴とする請求項１に記載の触媒コンバータ。

【請求項４】　上記無機質断熱材およびシール層に使う無機シートは、アルミナ、シリカ、アルミナ・シリカおよびガラスから選ばれるいずれか１種また２種以上からなる無機繊維材料とし、厚みが２～６㎜、充填密度が0.10～0.50g/cm^3 のものを用いることを特徴とする請求項１に記載の触媒コンバータ。

【請求項５】　上記金属製ネットは、線径：50～ 300μm で、目開き：＃20～ 150メッシュのステンレス鋼であり、金属シェル内周面にスポット溶接により固定して無機断熱材をここに保持するようにしたものである請求項１に記載の触媒コンバータ。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、自動車の排気ガス浄化用触媒コンバータに関し、特に無機断熱材および無機シート材を併用した断熱構造を特徴とする触媒コンバータに関するものである。

【０００２】

【従来の技術】車両に搭載する排気ガス浄化用触媒コンバータは、図１に示すクラムシェル型、および図２に示す圧入型に主として分けられる。前者のものは、触媒保持体４とその外側に被せる半割り状態の金属製シェル21、22と、これらの間に介装する無機シート３および金属ネット５を軸方向に並べて巻き付けたシール層により構成されている。一方、後者のものは、前記触媒保持体４の外側に無機シート３および金属ネット５からなるシール層を予め巻き付けてからこれを金属製シェル23の中に圧入したものである。

【０００３】一般に、前記無機シート３は、シリカ、アルミナ系のセラミックファイバー、未膨張バーミキュライト、無機結合材および有機弾性物質の混合物をシート状に成形したものであり、前記金属シェル２と触媒保持体４との間から排気ガスがリークするのを防ぐために用いられているシール層である。

【０００４】ところで、近年、自動車の高性能化および各種法規制により排気ガスの温度が著しく上昇しており、図１および図２に示した従来の触媒コンバータでは、上記無機シートの耐熱性が不足し十分なシール性を確保することが困難になってきている。その理由は、高温排気ガスの熱により無機シート内の未膨張バーミキュライトの膨張特性が劣化し、そのために排気ガスの脈圧で無機シートが風蝕されるためと考えられている。

【０００５】従来技術が抱えている上述した問題点を解決する手段としては、クラムシェル型の触媒コンバータについては、触媒保持体４の前後に、図３に示すような金属製プレス部品61、62（以下、これをコーンという）を設置すると共に、これを金属シェル21、22にて包囲し、必要に応じ該金属シェル21、22とコーン61、62との隙間に無機断熱材７を介在させることにより、金属シェルに伝播される排気ガスの熱を遮断することにより、該金属シェル21、22の熱変形を抑制し、無機シート製シール層の耐久性を確保することを目的とした２重コーン型触媒コンバータも開発されている。このような構造（２重コーン構造）にすることにより、排気ガスの熱は金属シェルに伝播されることなく、従来よりも高温の状態で触媒保持体へ流入するようになるので、エンジン始動直後の排気ガス浄化性能の向上が期待できる。

【０００６】

【発明が解決しようとする課題】しかしながら、この２重コーン構造の触媒コンバータは、コーン61、62がステンレス鋼板を用いたプレス部品であるため、金属シェル同様、排気ガスの熱により熱膨張し、触媒保持体４との相互干渉により触媒保持体４が損傷するおそれがあった。その干渉を防止する対策としては、コーン61、62と触媒保持体４との間に隙間を確保する必要があった。

【０００７】ところが、上記のような隙間を設けると、排気ガスの熱は、金属シェル、および無機シートにアタックするため、金属シェルの熱変形あるいは無機シートの熱劣化が起きるため、無機シートの飛散を完全に抑制することは困難であった。また、コーン61、62と金属シェル21、22との隙間に、無機断熱材を介在させた場合にも、上述したと同様にコーン61、62と触媒保持体４との隙間から排気ガスのアタックを受けるため、無機断熱材が著しく飛散しやすくなるという問題点があり、かかる問題点を解決する手段として、ステンレス製メッシュの成形体あるいはシリカファイバー等の無機繊維クロスを用いてコーンと触媒保持体の隙間をふさぐ構造が知られているが、いずれも部品点数の増加ならびにコストアップとなってしまう。

【０００８】そこで、本発明は、従来技術が抱えているこうした問題点に鑑み、金属シェルに伝播される排気ガスの熱を抑制することにより、金属シェルの変形を防止して前記無機シール材の耐久性を向上させることにあ

る。また、本発明の他の目的は、耐熱性、耐久性に優れた排ガス浄化用触媒コンバータを低コストにて提供しようとするものである。

【０００９】

【課題を解決するための手段】上掲の目的を実現するべく鋭意研究した結果、本発明者らは、柱状の触媒保持体と、この触媒保持体の外側に被せる円筒もしくは半割り状の金属シェルおよびこれらの間に介装挟持した無機シートからなるシール層によって構成された触媒コンバータにおいて、該触媒コンバータの軸方向の両端部近傍の金属シェル内周面に、金属製ネットを介して無機質断熱材を取付けたことを特徴とする排気ガス浄化用触媒コンバータを開発したのである。

【００１０】上記無機質断熱材の金属シェル内周面への取付けは、触媒コンバータの軸方向の両端部から触媒保持体の外周部に巻き付けられたシール層の両端部にかけての領域とすることが好ましい。また、上記無機質断熱材の金属シェル内周面への取付けは、触媒コンバータの軸方向の両端部から触媒保持体およびシール層の各端部に接する領域とすることが好ましい。さらに、上記無機断熱材およびシール層に使う無機シートは、アルミナ、シリカ、アルミナ・シリカおよびガラスから選ばれるいずれか１種また２種以上からなる無機繊維材料とし、厚みが２～６mm、充填密度が0.10～0.50g/cm^3 のものを用いることが好ましい。さらにまた、上記金属製ネットは、線径：50～ 300μm で、目開き：＃20～ 150メッシュのステンレス鋼であり、金属シェル内周面にスポット溶接により固定して無機断熱材を保持するようにすることが好ましい。

【００１１】

【発明の実施の形態】本発明の特徴は、コンバータの軸方向両端部近傍の金属シェル内周面、すなわちその両端部から内装した触媒保持体の両端部にかけての領域に当たるガスの導入・排出側に、無機断熱材をステンレス製ネットを介して取付けた点にある。この領域に無機断熱材を取付けた理由の第一は、金属シェルや無機シート材からなるシール層への排気ガス侵入が防げるため、該金属シェルやシール層の耐久性を著しく高めることができることにある。第二の理由は、無機断熱材およびステンレス製ネットの端部が触媒保持体の各端部に接することにより、該触媒保持体が軸方向で”ずれ”ることを無くすことにある。このことにより、従来構造では保持性能の面から使用ができなかった、低充填密度（0.10～0.50g/cm^3 ）の無機シートをシール層として採用することが可能となり、低コスト化が実現できるようになる。

【００１２】本発明においてシール層に用いる無機シート（材）および無機断熱材としては、アルミナ、シリカ、アルミナ・シリカおよびガラスから選ばれる１種以上の無機繊維材料を使用することができる。これらの材料に着目した理由は、従来の膨張性シール材に比べると、排気ガスの熱による劣化が起こりにくいため、使用限界温度を飛躍的に向上させることができるからである。

【００１３】本発明において、無機シート（材）からなるシール層において、その厚みを２～６mmに限定した理由は、２mmより小さいと、断熱性が不足し、排気ガスの熱が金属シェルに伝播するため、金属シェルが熱変形してしまうからである。一方、６mmよりも大きいと、触媒コンバータ自体の径が大きくなり、実質上、自動車に搭載することが困難になるからである。

【００１４】本発明において、無機シート（材）からなるシール層において、その充填密度を0.10～0.50g/cm^3 に限定した理由は、0.10g/cm^3 より小さいと、所定の保持力が得られず排気ガスの脈圧により飛散するおそれがあり、一方、0.50g/cm^3 より大きくすると、無機繊維が折損するおそれがあるからである。なお、このシール層の充填密度は、0.20～0.40g/cm^3 の範囲内することがより好適である。

【００１５】本発明において無機断熱材を金属シェル内周面に取付けるために溶接固定するのに用いるステンレス製ネットについて、その線径を50～ 300μm に限定した理由は、50μm より細いと耐久性が不足し、ネットが破断し断熱材が飛散してしまうし、 300μm より太いとネット自体の剛性が高くなり、触媒保持体を破壊してしまうからである。また、目開き寸法を＃20～＃150 の範囲内に限定した理由は、＃20より小さいと、開口部より断熱材が飛散し、＃150 より多いと、ネット自体の剛性が高くなり、触媒保持体を破壊してしまうからである。

【００１６】なお、無機断熱材およびステンレス製ネットの金属シェル内周面への取付け領域については、触媒コンバータの軸方向両端部から触媒保持体の外周部に巻き付けられたシール層の両端部にかけての領域を全てカバーするように取付ける。この領域に限定して取付ける理由は、無機断熱材が触媒保持体の端部と接していないと、隙間から高温排気ガスが流入し金属シェルにその熱を伝播させるため、該金属シェルが熱変形するばかりでなく、シール層にアタックしてこれを劣化させ、飛散の原因につながるからである。

【００１７】

【実施例】

実施例１

本発明の実施例にかかる排気ガス浄化用触媒コンバータにつき、図４を用いて説明する。本発明にかかるコンバータは、図４に示すように、柱状の触媒保持体４と該触媒保持体の外側に被せる半割り状の金属シェル21、22及びこれらの間に介装挟持した無機シートからなるシール層３によって構成された触媒コンバータ１において、該触媒コンバータの軸方向の両端部近傍の金属シェル内周面にステンレス製ネット８を介して無機質断熱材７を設置した構成となっている。

【００１８】ここで、前記シール層３および無機質断熱材７は、アルミナファイバーのマット状物であり、充填密度は0.30g/cm^3 となるように設定されている。なお、上記無機質断熱材７の金属シェル21、22内周面への取り付け範囲は、触媒コンバータ１の軸方向の両端部から前記シール層３の両端部にかけての領域とした。

【００１９】次に、ステンレス製ネット８は，線径 150μm 、目開き50メッシュのステンレス金網を用い、金属シェル21、22内周面に配設されている前記無機質断熱材をスポット溶接により固定保持している。なお、上記ステンレス製ネットの金属シェル内周面への取り付け範囲は、触媒コンバータの軸方向の両端部から前記触媒保持体４およびシール層３の各端部に接する領域とする。

【００２０】比較例１

本発明の比較例としての排気ガス浄化用触媒コンバータにつき、図３を用いて説明する。図３に示すごとく、この比較例の排気ガス浄化用触媒コンバータ１は、熱膨張性シール層３が巻き付けられた柱状の触媒保持体４と、該触媒保持体の前後に少なくとも 0.5mm以上の隙間を設けてコーン61、62を設置すると共に、これを金属シェル21、22で包囲した構成であり、その金属シェル21、22とコーン61、62の隙間にはセラミックファイバーのマット状物が介挿してある。

【００２１】

【発明の効果】以上説明したように、本発明によれば、高耐熱、高耐久性を有する排ガス浄化用触媒コンバータを低コストで提供することができる。

【図面の簡単な説明】

【図１】クラムシェル型の触媒コンバータの分解斜視図である。

【図２】圧入型の触媒コンバータの分解斜視図である。

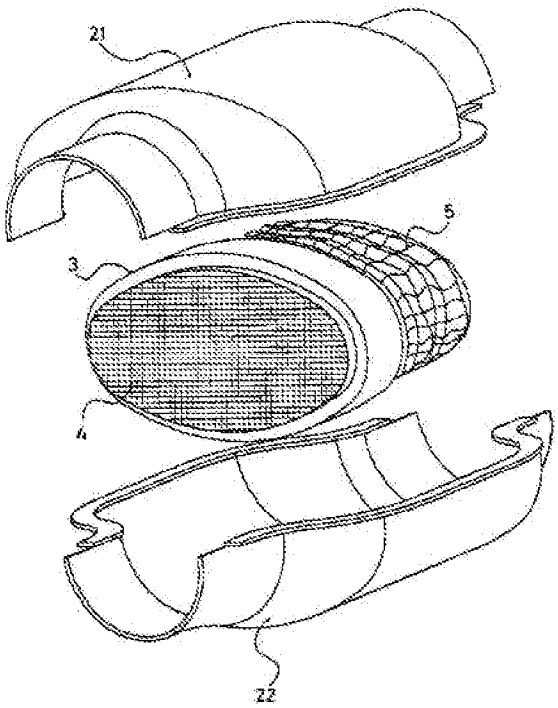
【図３】２重コーン型の触媒コンバータの分解斜視図である。

【図４】本発明にかかる触媒コンバータの断面図である。

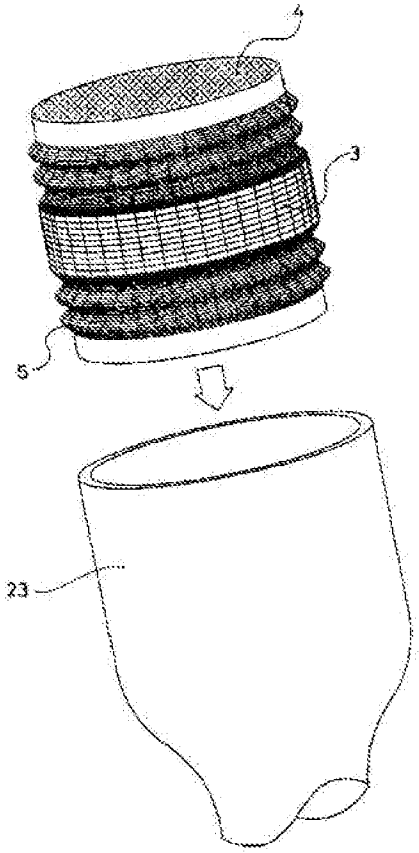
【符号の説明】

１　触媒コンバータ
21、22　金属シェル
３　シール層
４　触媒保持体
７　無機質断熱材
８　ステンレス製ネット

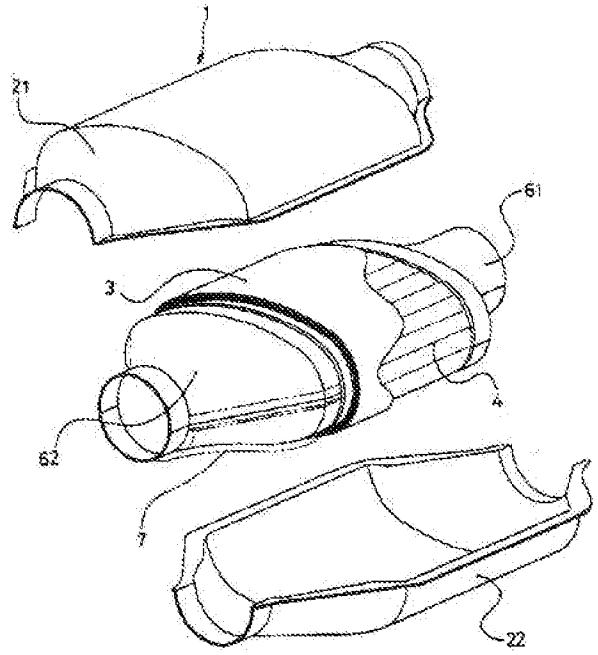
【図１】



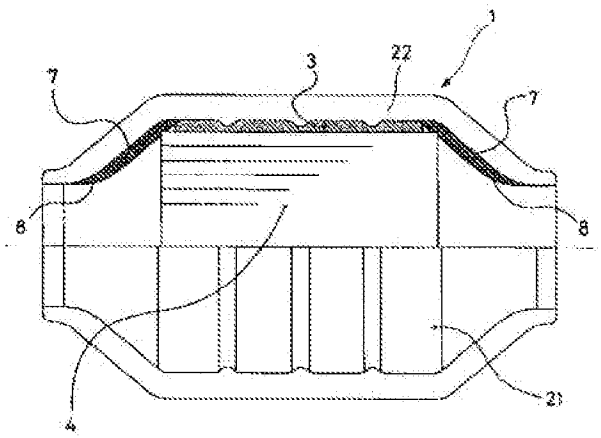
【図２】



【図３】



【図４】



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